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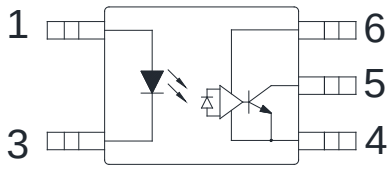
KPC611 Series

5PIN HIGH-SPEED OUTPUT PHOTOCOUPLER

Description

The KPC611 series consist of an LED optically coupled to an OPIC chip. It is a high-speed digital output type photo coupler designed specifically for low circuit current. And it is packaged in a 5pin mini-flat package.

Schematic



1. Anode
3. Cathode
4. GND
5. Vo
6. Vcc

Features

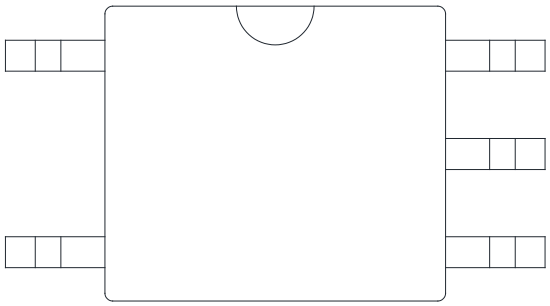
- Pb free and RoHS compliant
- Dual voltage operation (3.3V/5V)
- 10 kV/μs minimum Common Mode Rejection (CMR) at VCM = 1000V (3.3V operating voltage)
- High speed: 10 MBd typical
- LVTTL/LVCMOS compatible
- Low input current capability: 5 mA
- Guaranteed AC and DC performance over temperature: –40°C to +110°C
- Safety Approvals:
  CQC GB4943.1-2022

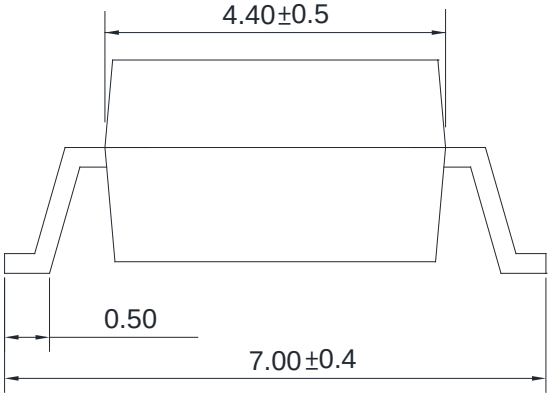
Applications

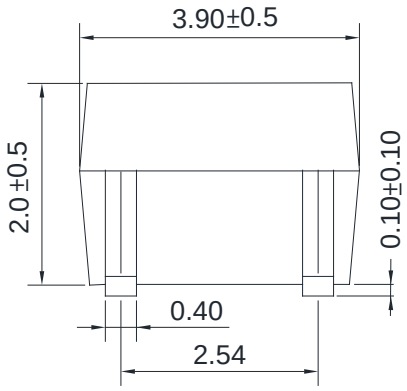
- Isolated line receiver
- Computer-peripheral interfaces
- Microprocessor system interfaces
- Digital isolation for A/D, D/A conversion
- Switching power supply
- Instrument input/output isolation
- Ground loop elimination
- Pulse transformer replacement
- Field buses

Outside Dimension

Unit : mm







TOLERANCE: ±0.2mm

Device Marking

Notes:

cosmo
611
YWW Y: Year code / WW: Week code

● Absolute Maximum Ratings

(Ta=25℃)

Parameter		Symbol	Rating	Unit
Input	Forward current	I_F	25	mA
	Peak forward current (1)	I_{FM}	40	mA
	Reverse voltage	V_R	5	V
	Power dissipation	P_D	45	mW
Output	Supply voltage	V_{CC}	7	V
	High level output voltage	V_{OIL}	7	V
	Low level output current	I_{OL}	50	mA
	Output collector power dissipation	P_C	85	mW
Isolation voltage (2)		Viso	3750	Vrms
Operating temperature		Topr	-40 to +110	℃
Storage temperature		Tstg	-55 to +125	℃
Soldering temperature 10 seconds		Tsol	260	℃

Note 1: Pulse width (PW) ≤ 1 ms, duty = 50 %
Note 2: This device is considered as a two-terminal device: Pins 1 and 3 are shorted together, and pins 4, 5 and 6 are shorted together.

● Electro-optical Characteristics

Over recommended operating condition (TA = –40°C to +110°C, 2.7V ≤ VDD≤ 3.6V) unless otherwise specified.
All Typical specifications at VCC = 3.3V, TA = 25°C.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input forward voltage	V_F	I_F=10mA	-	1.35	1.7	V
Input reverse voltage	V_{BR}	I_R=10uA	5	-	-	V
Input capacitance	C_{IN}	VF=0, f=1MH$_Z$	-	60	-	pF
High Level Output Current	I_{OH}	Vcc=3.3V,V_O=3.3V,V_F=0.8V	-	2	10	μA
Low Level Output Voltage	V_{OL}	Vcc=3.3V,I_F=7.5mA, I_{OL}(Sinking)=13mA	-	0.3	0.5	V
High Level Supply Current	I_{CCH}	Vcc=3.3V,I_F=0mA	-	3	7	mA
Low Level Supply Current	I_{CCL}	Vcc=3.3V,I_F=10mA	-	3	7	mA
Input Threshold Current	I_{TH}	TA =–40°C to 85°C VCC = 3.3V, VO = 0.6V, I_{OL} (Sinking) = 13 mA	-	2.5	5	mA
Isolation resistance (input-output) (3)	R_{I-O}	V_{I-O}=500V	-	10^{12}	-	Ω
Capacitance (input-output) (3)	C_{I-O}	f=1MH$_Z$	-	0.6	-	pF

Over recommended temperature (TA = –40°C to +110°, 4.5V≤ VDD ≤ 5.5V) unless otherwise specified.
All Typical specifications at VCC = 5V, TA = 25°C.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input forward voltage	V_F	I_F=10mA	-	1.35	1.7	V
Input reverse voltage	V_{BR}	I_R=10uA	5	-	-	V
Input capacitance	C_{IN}	VF=0, f=1MH$_Z$	-	60	-	pF
High Level Output Current	I_{OH}	Vcc=5V,V_O=5V,V_F=0.8V	-	2	10	μA
Low Level Output Voltage	V_{OL}	Vcc=5V,I_F=7.5mA, I_{OL}(Sinking)=13mA	-	0.2	0.4	V
High Level Supply Current	I_{CCH}	Vcc=5V,I_F=0mA	-	4	7	mA
Low Level Supply Current	I_{CCL}	Vcc=5V,I_F=10mA	-	4	7	mA
Input Threshold Current	I_{TH}	VCC = 5V, VO = 0.6V, I_{OL} > 13 mA	-	3	5	mA
Isolation resistance (input-output) (3)	R_{I-O}	V_{I-O}=500V	-	10^{12}	-	Ω
Capacitance (input-output) (3)	C_{I-O}	f=1MH$_Z$	-	0.6	-	pF

Note 3: This device is considered as a two-terminal device: Pins 1 and 3 are shorted together, and pins 4, 5 and 6 are shorted together

● Switching Specifications

Over recommended temperature (TA = –40°C to +110°C), VCC = 3.3V, IF = 7.5 mA unless otherwise specified.
All Typical specifications at TA = 25°C.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Propagation delay time to high output level	t_{PLH}	I_F=7.5mA,Vcc=3.3V,R_L=350Ω, C_L=15pF	-	60	90	ns
Propagation delay time to low output level	t_{PHL}		-	45	70	ns
Pulse Width Distortion	|tPHL – tPLH		-	-	30	ns
Propagation Delay Skew	tPSK		-	-	30	ns
Rise time	t_r	I_F=7.5mA,Vcc=3.3V,R_L=350Ω, C_L=15pF	-	30	-	ns
Fall time	t_f		-	5	-	ns
High level Common Mode Transient Immunity	CM_H	I_F=0mA,Vcc=3.3V V_{CM}=10V, V_O(Min)=2.0V R_L=350Ω	10,000	-	-	V/us
Low level Common Mode Transient Immunity	CM_L	I_F=7.5mA, Vcc=3.3V V_{CM}=10V, V_O(Max)=0.8V R_L=350Ω	10,000	-	-	V/us

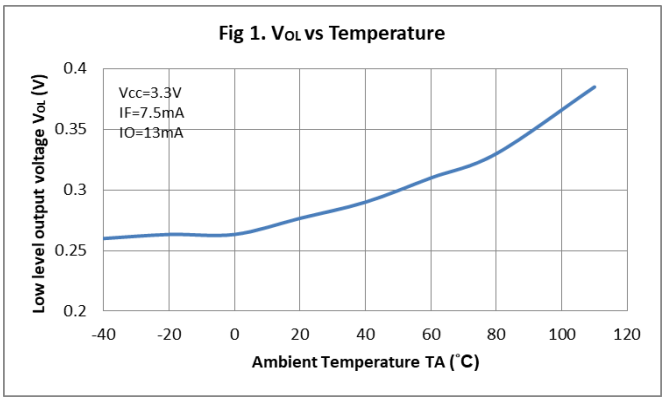
Over recommended temperature (TA = –40°C to +110°C), VCC = 5 V, IF = 7.5 mA unless otherwise specified.
All Typical specifications at TA = 25°C.

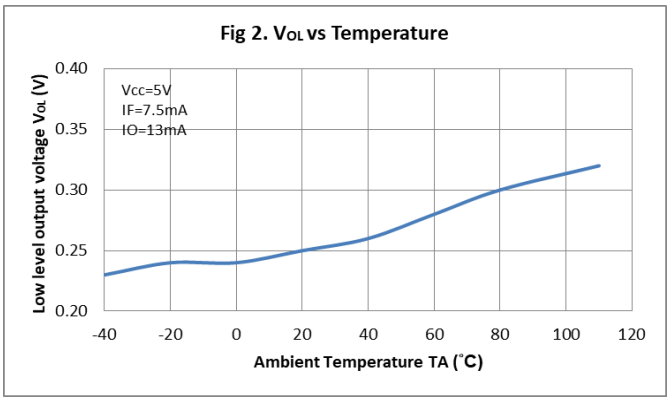
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Propagation delay time to high output level	t_{PLH}	I_F=7.5mA,Vcc=5V,R_L=350Ω, C_L=15pF	-	60	90	ns
Propagation delay time to low output level	t_{PHL}		-	50	70	ns
Pulse Width Distortion	|tPHL – tPLH		-	-	30	ns
Propagation Delay Skew	tPSK		-	-	30	ns
Rise time	t_r	I_F=7.5mA,Vcc=5V,R_L=350Ω, C_L=15pF	-	30	-	ns
Fall time	t_f		-	5	-	ns
High level Common Mode Transient Immunity	CM_H	I_F=0mA, Vcc=5V V_{CM}=1000V,V_O(Min)=2.0V R_L=350Ω	10,000	-	-	V/us
Low level Common Mode Transient Immunity	CM_L	I_F=7.5mA,Vcc=5V V_{CM}=1000V,V_O(Max)=0.8V R_L=350Ω	10,000	-	-	V/us

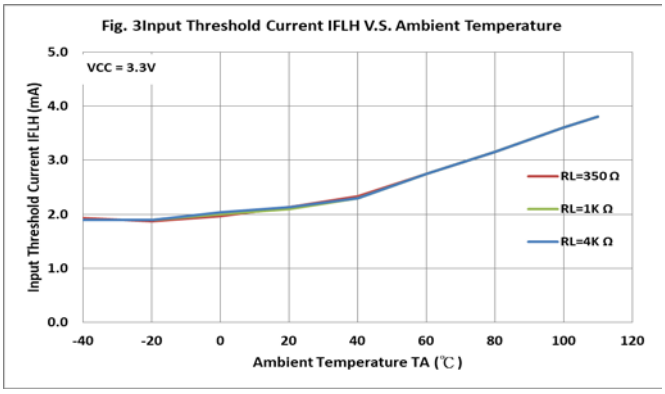
Recommended Operating Conditions

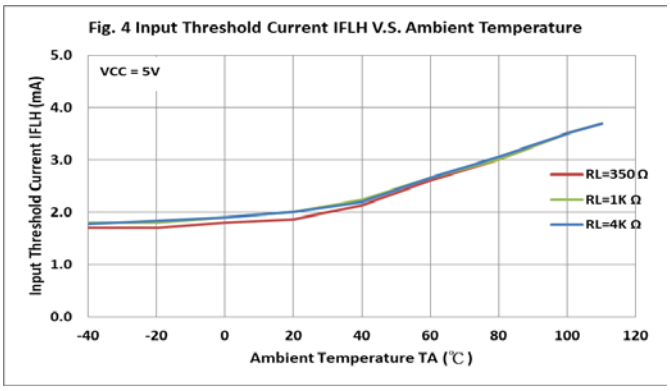
Parameter	Symbol	Min	Max	Unit
Low level input current	I_{FL}	0	250	μA
High level input current	I_{FH}	6	15	mA
Supply voltage	V_{CC}	2.7	3.6	V
		4.5	5.5	
Fan out (TTL load)	N	-	5	-
Operating temperature	T_{opr}	-40	+110	℃

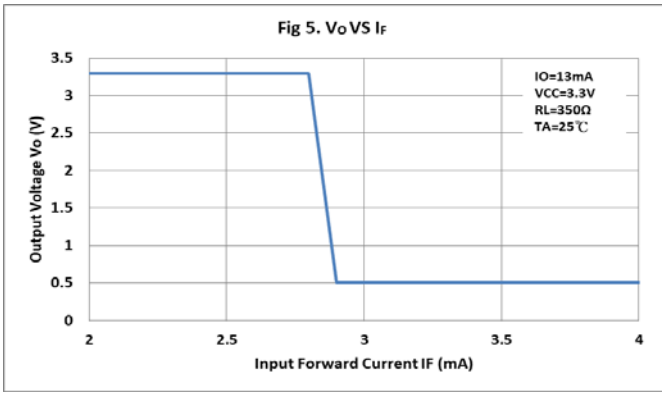
Characteristics Curves

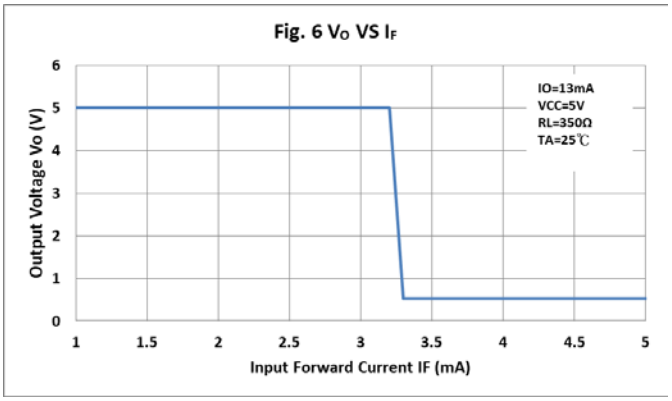


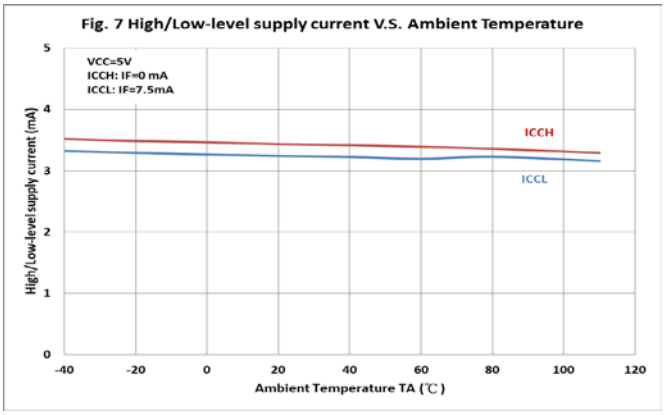












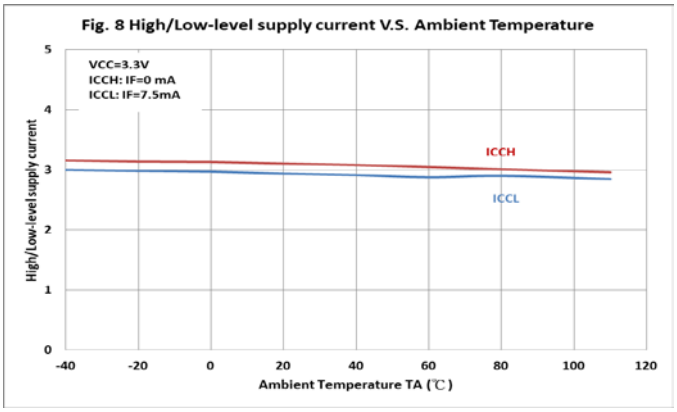


Fig.9 Propagation Delay Time V.S. Ambient Temperature

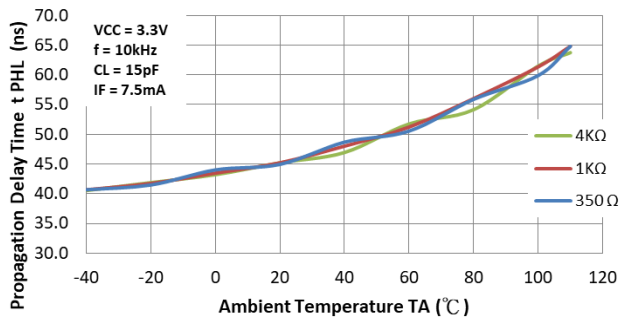


Fig.10 Propagation Delay Time V.S. Ambient Temperature

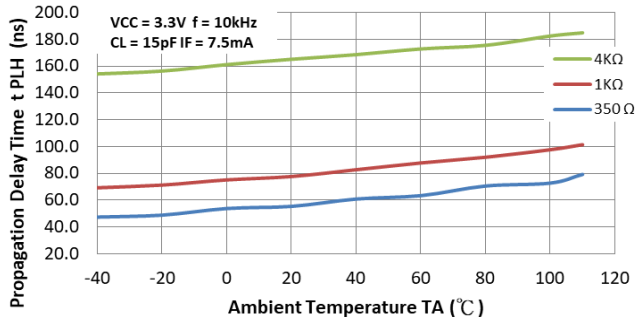


Fig.11 Pulse Width Distortion V.S. Ambient Temperature

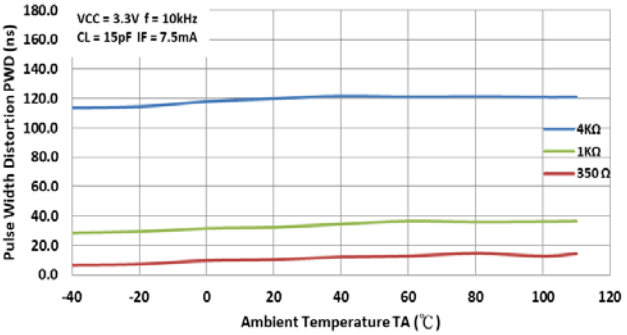


Fig.12 Propagation Delay Time V.S. Ambient Temperature

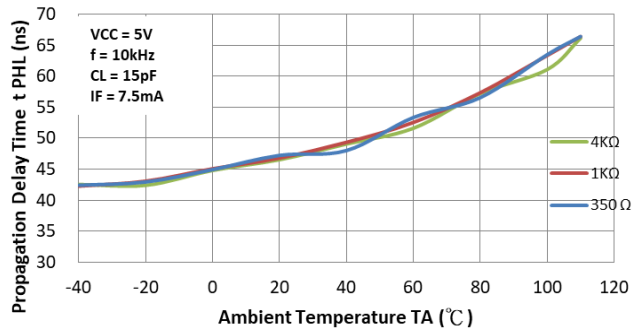


Fig.13 Propagation Delay Time V.S. Ambient Temperature

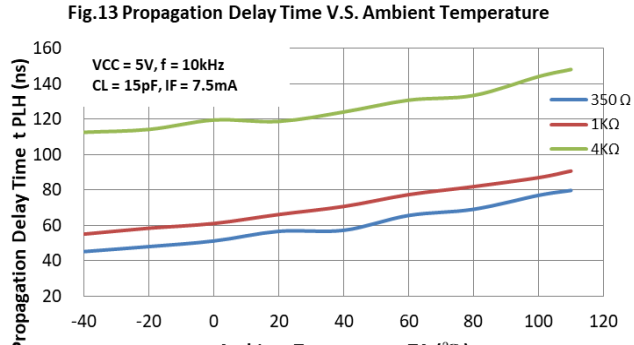


Fig. 14 Pulse Width Distortion V.S. Ambient Temperature

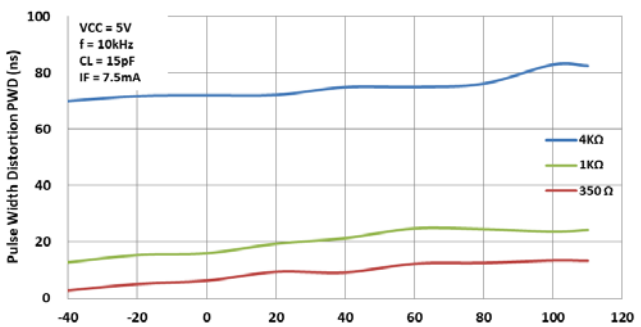
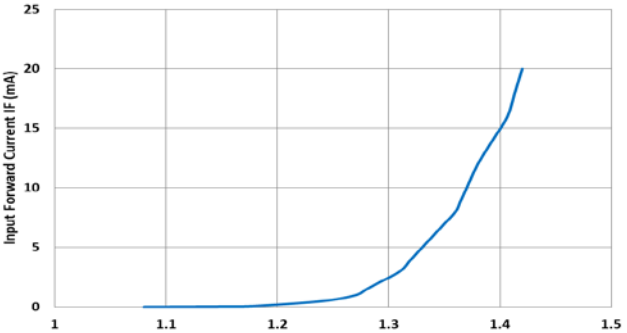
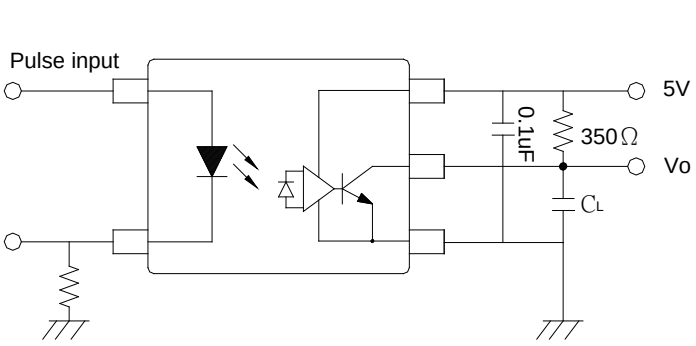
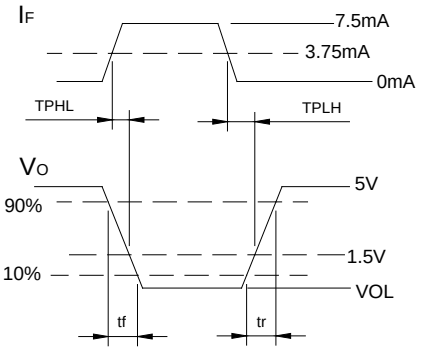


Fig. 15 IF-VF

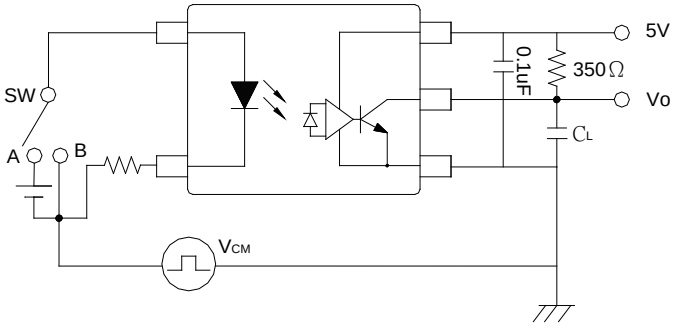


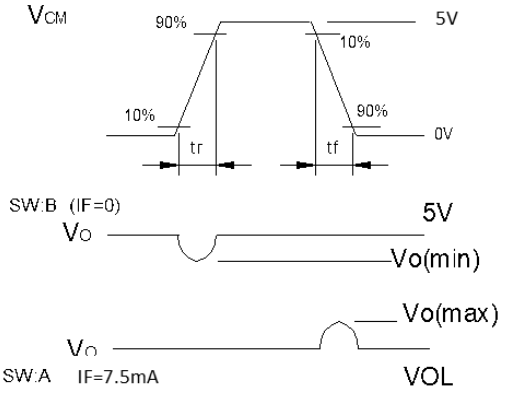
● Test Circuit for Propagation Delay time





● Test Circuit for Instantaneous Common Mode Rejection Voltage



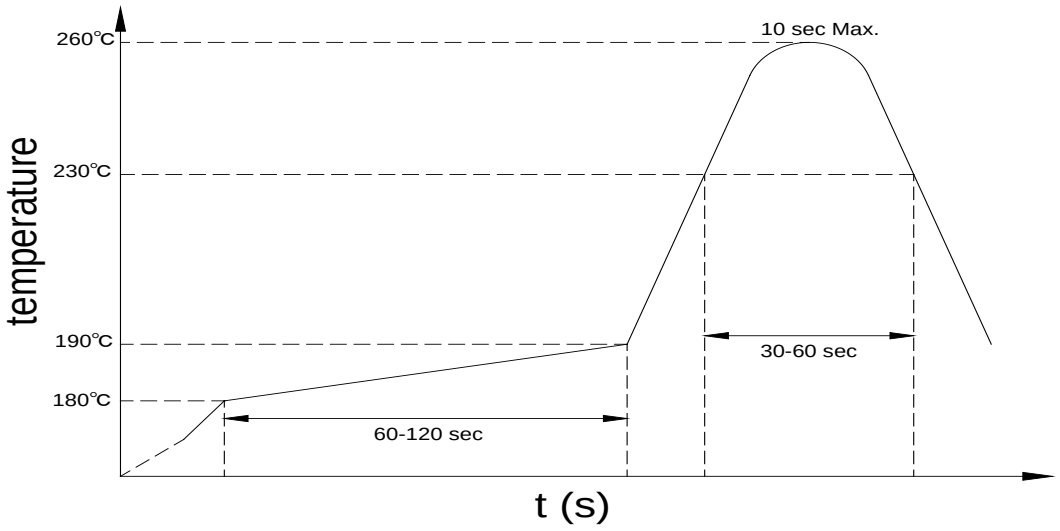


● Recommended Soldering Conditions

(a) Infrared reflow soldering：

- ■ Peak reflow soldering： 260℃ or below (package surface temperature)
- ■ Time of peak reflow temperature： 10 sec
- ■ Time of temperature higher than 230℃： 30-60 sec
- ■ Time to preheat temperature from 180~190℃： 60-120 sec
- ■ Time(s) of reflow： Two
- ■ Flux： Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

Recommended Temperature Profile of Infrared Reflow



(b) Wave soldering：

- ■ Temperature： 260℃ or below (molten solder temperature)
- ■ Time： 10 seconds or less
- ■ Preheating conditions： 120℃ or below (package surface temperature)
- ■ Time(s) of reflow： One
- ■ Flux： Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

(c) Cautions：

- ■ Fluxes： Avoid removing the residual flux with freon-based and chlorine-based cleaning solvent.
- ■ Avoid shorting between portion of frame and leads.

- **Numbering System**

KPC611 (Z)

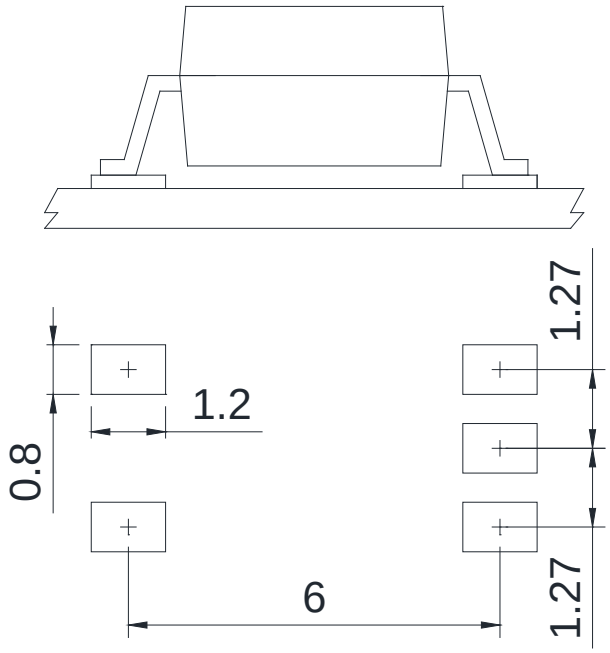
Notes:

KPC611 = Part No.

Z = Tape and reel option (TLD, TRU)

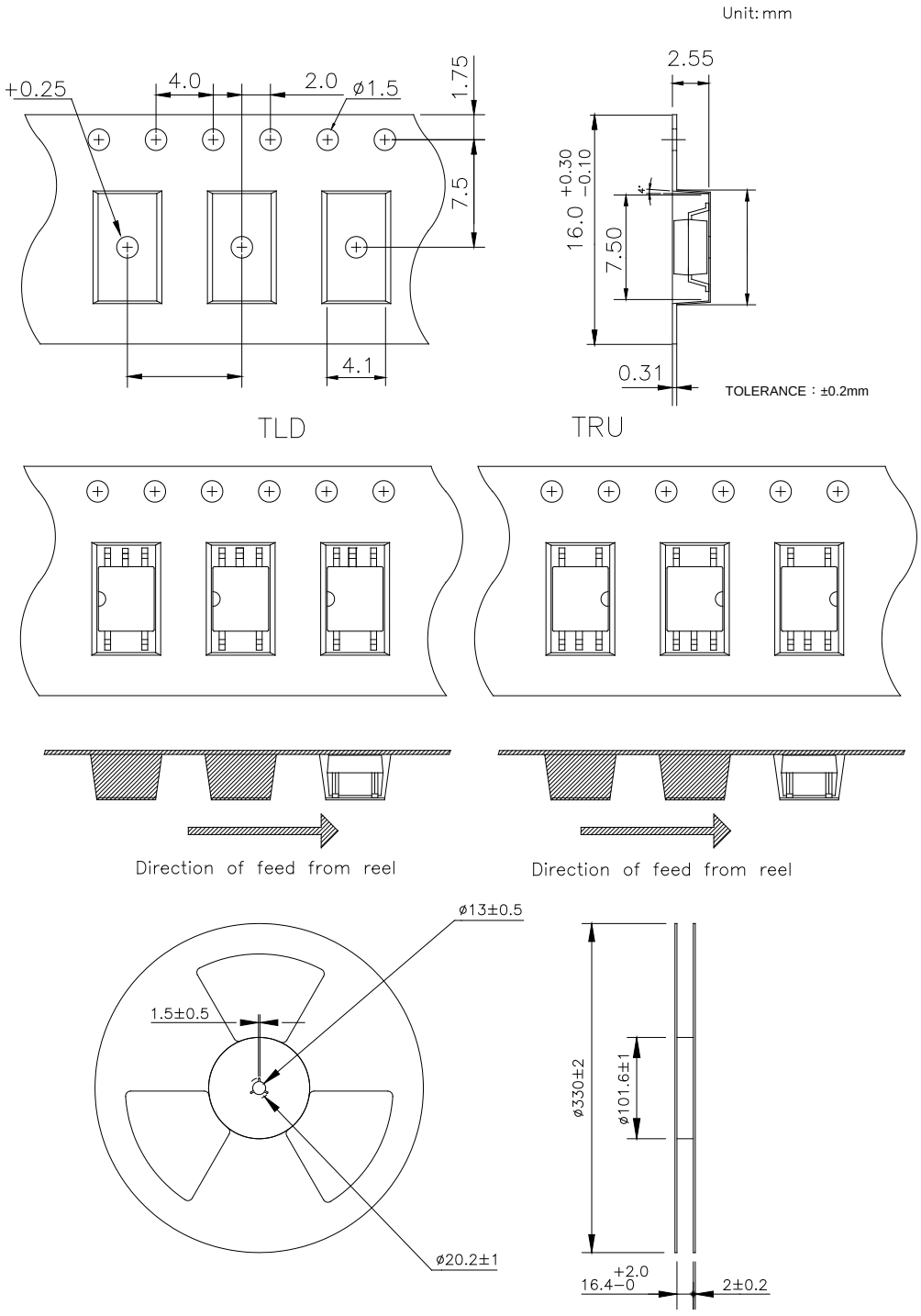
Option	Description	Packing quantity
TLD	TLD tape & reel option	3000 units per reel
TRU	TRU tape & reel option	3000 units per reel

- **Recommended Pad Layout for Surface Mount Lead Form**



Unit : mm

● SOP Carrier Tape & Reel



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